

U.S.S.N. 10,656,986

Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to clarify Applicants claim language and to clearly overcome Examiners interpretation of sub-pattern density as being equivalent to sub-pattern shape to clearly overcome the cited art.

Support for the amendments is found in the original claims and the Specification including Figure 3, Figures 4A-4D, and Figure 5.

No new matter has been added.

Claim Rejections under 35 USC 102

1. Claims 1-10, 12-18, and 20-21 stand rejected under 35 USC Section 102(e) as being anticipated by Subramanian et al. (US 6,803,178).

Subramanian et al. disclose a method for exposing the same feature pattern but with a different density (pitch) (i.e., dense

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vs. isolated) between the same feature pattern under different illumination conditions and using different masks (see Abstract; Figures 4A, 4B, Figures 5A, 5B, Figures 6 and Figures 7). The invention of Subramanian et al. is directed at overcoming the problem of **patterning errors** (e.g., vias patterned a different size and location) caused by a smaller process window (overlapping regions of optimal exposure dose and defocus) for small feature patterns having different areas of density (see col 1, lines 39-63; col 2, line 65-col 3, line 11).

The method of Subramanian et al. teaches a method for making **a plurality of features (same feature pattern)** having **dense regions and isolated regions** (defined as **having a different pitch or spacing between features** (see col 3, lines 11-33)). Thus in Figures 4A and 4B (and Figures 5A and 5B using negative resist), Subramanian et al. shows the formation of vias (same feature/pattern) in a dense region and an isolated region (see col 4, lines 18-20) preferably using different defocus conditions (col 4, lines 44-48).

Subramanian et al. also teaches that the same method may be used to pattern a **plurality of features (the same feature/pattern)** in a conductive layer such as gate electrodes, emitter regions of a bipolar transistor. Thus in Figure 6,

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Subramanian et al. shows the patterning of metal electrodes by **separately exposing dense and then isolated portions of the photoresist with the same feature pattern.** Figure 7 shows a completed device with different features (vias, metallization lines) formed by the method of separately exposing under different photoexposure conditions the dense regions and the isolated regions **for the same feature/pattern.**

Thus, Subramanian et al. fails to disclose several aspects of Applicants disclosed and claimed invention including those elements in **bold type.**

"exposing within a single die region within the photoresist layer a minimum of two non-overlapping die sub-patterns while employing a minimum of two masks, each of said masks associated with one of said non-overlapping die sub-patterns, **each of said non-overlapping die sub-patterns comprising a different pattern complexity, said pattern complexity including orientation and/or shape, said shape distinguished from said pattern density, each of said non-overlapping die sub-patterns subjected to a different photoexposure condition.**"

Subramanian et al. nowhere discuss or suggest **die sub-patterns having a different pattern complexity.** Rather, as noted

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above, the invention of Subramanian et al. is directed to **patterning dense versus isolated regions** on the photoresist layer with the same pattern (feature) complexity (i.e., a line).

In addition, with respect to claims 6 and 14, Subramanian et al. fail to disclose:

"exposing within a single die region within the photoresist layer a minimum of two non-overlapping die sub-patterns while employing a minimum of two masks and two exposure conditions, each of said masks associated with one of said non-overlapping die sub-patterns, each of said non-overlapping die sub-patterns comprising a different pattern density and a different pattern complexity, said pattern complexity including orientation and/or shape, said shape distinguished from said pattern density, each of said non-overlapping die sub-patterns subjected to a different photoexposure condition."

Examiner has argued that since Subramanian et al. disclose a different pattern (line) density, that this is equivalent to a different feature complexity including a different shape. While Applicants respectfully disagree with Examiners interpretation and such interpretation is contrary to Applicants disclosing and claiming both a different pattern density and a different pattern complexity, the claims have been amended to clearly overcome

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Examiners interpretation.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim Rejections under 35 USC 103

2. Claims 11 stands rejected under 35 USC Section 103(a) as being unpatentable over Subramanian et al., above, in view of Lai et al.

Applicants reiterate the comments made above with respect to Subramanian et al.

The fact that Lai et al. generally teach that the exposure

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energy, the exposure time, and the depth of focus affect the line width of a pattern does not further help Examiner in producing Applicants invention.

"First, there must be some **suggestion or motivation**, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. **Second**, there must be a **reasonable expectation of success**. **Finally**, the prior art reference (or references when combined) **must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Conclusion

The cited references, either individually or in combination, fail to produce Applicants disclosed and claimed invention and are therefore insufficient to make out a *prima facie* case of anticipation or obviousness.

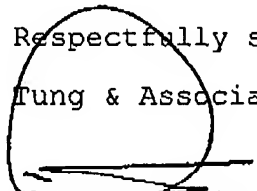
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The claims have been further amended to further clarify and define over Examiners interpretation of the prior art as well as Applicants claim language. Applicants respectfully request favorable reconsideration of their claims and submit that the Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

In the event that the present invention as claimed is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,

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